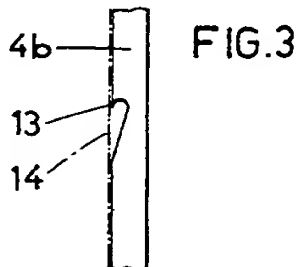


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(54) A device for preneedling a fibrous web

(57) A device for preneedling a fibrous web comprising at least one needle board reciprocatingly movable in a stitching direction, whose needles are formed with barbs 13 for entraining the fibres of the web, and a web guide which consists of a stitch base opposite the needle board and a stripper between the stitch base and the needle board. The needles are arranged in two portions, those on the supply side of the needle board and those on the remainder of the needle board. The needles on the supply side portion have either a denser distribution or coarser barbs than the remaining needles. Also the barbs of the needles on the supply side portion lie within the contour 14 of the working part of the needles. In one embodiment the supply side portion does not extend over more than one third, preferably not more than one quarter of the needle board area.



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FIG.1

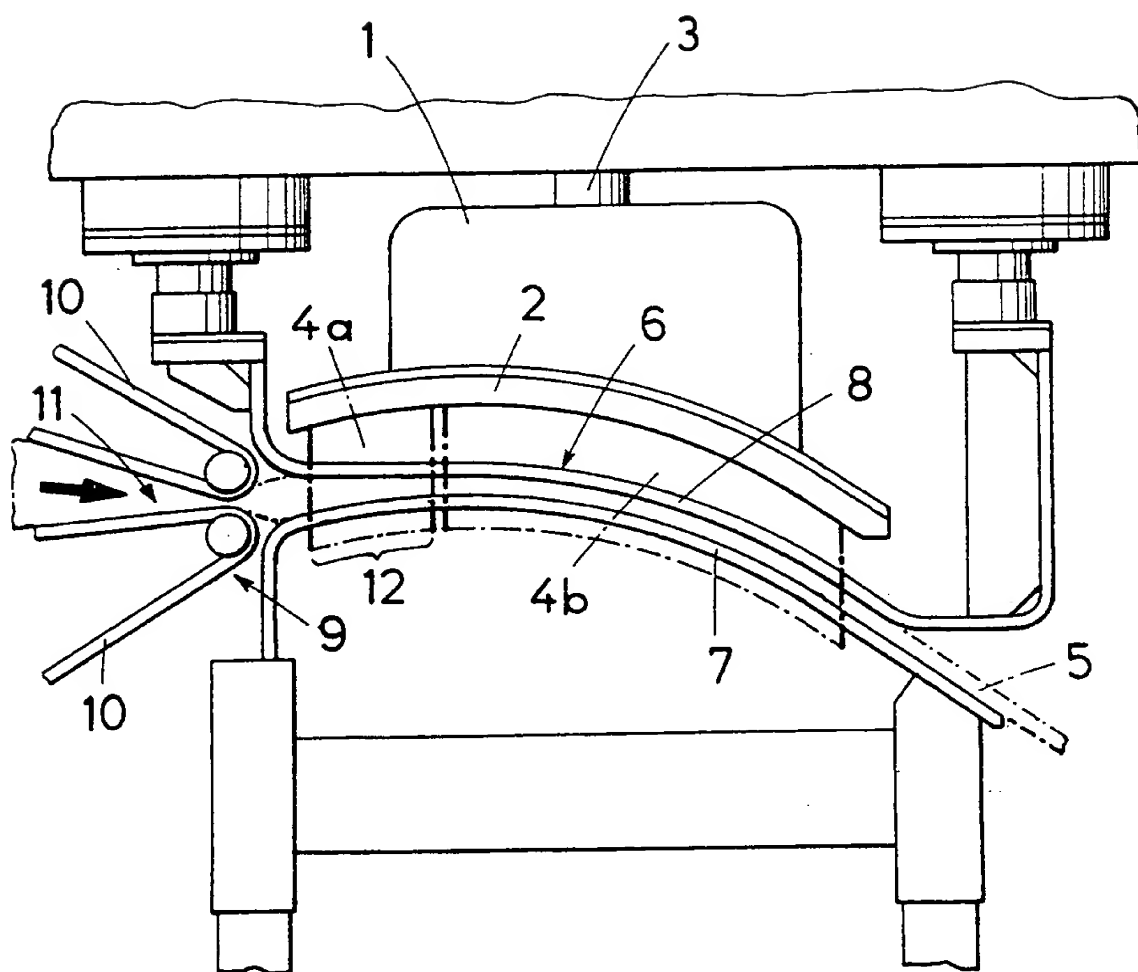


FIG.2

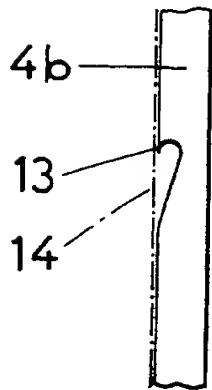
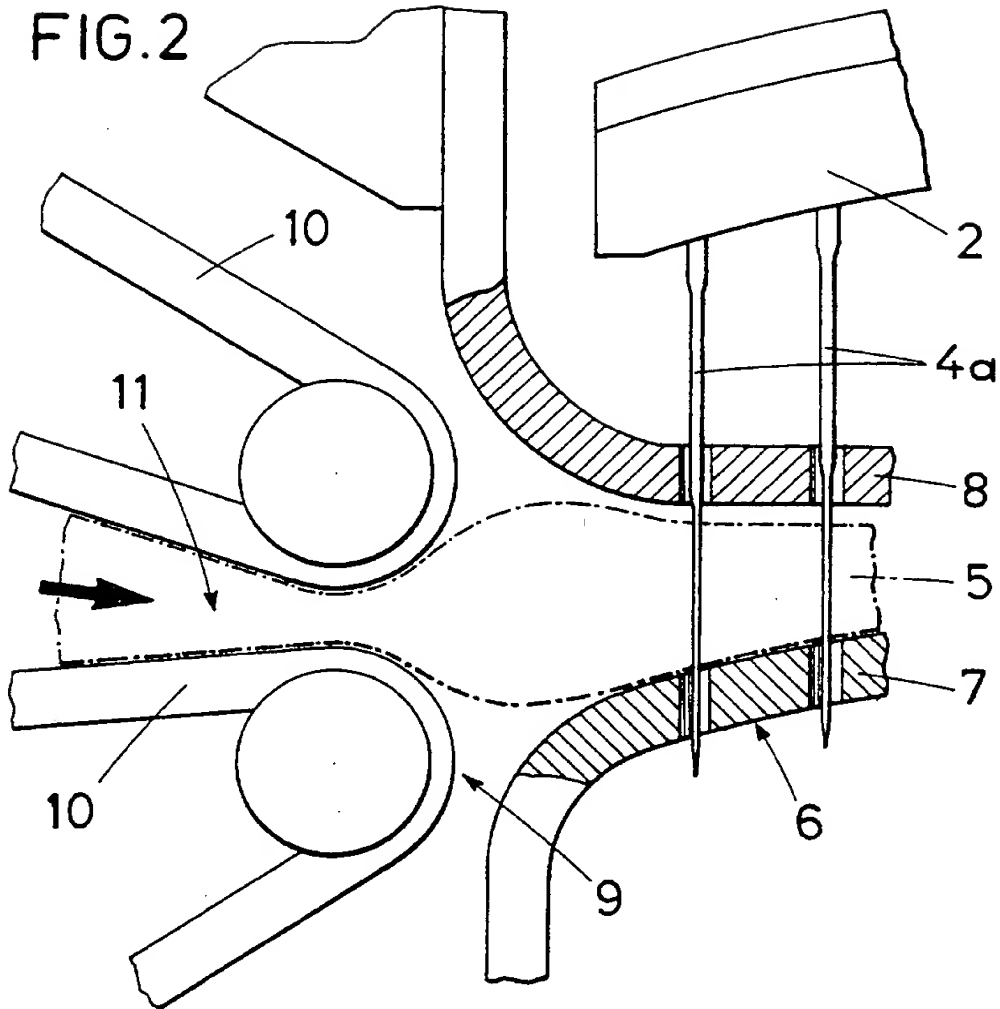


FIG.3

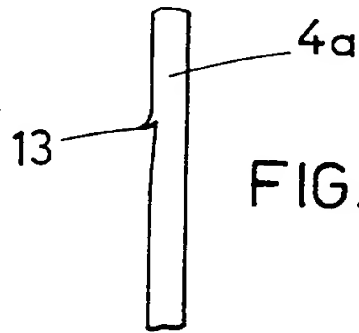


FIG.4

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Device for Preneedling a Fibrous Web

This invention relates to a device for preneedling a fibrous web, comprising at least one needle board reciprocatingly movable in stitching direction, whose needles form barbs for entraining the fibers, and comprising a web guide, which consists of a stitch base opposite the needle board and a stripper between the stitch base and the needle board.

To ensure a sufficient coherence of the fibers for the further processing of a fibrous web, the fibrous webs are subjected to a preneedling directly subsequent to their manufacture, which preneedling should ensure a sufficient web felting for the further processing. Since an unneedled fibrous web has a comparatively large thickness due to the substantially loose coherence of the fibers, it must be compressed when it is introduced into the web guide required in the vicinity of the needle board, in which web guide the decrease in thickness during needling must be taken into account. This compression of the unneedled fibrous web directly before the web guide is effected by means of a web inlet in the form of circulating guiding belts, which between each other form a wedge-type gap converging towards the web guide. Although these guiding strips are brought as closely as possible to the web guide, an elastic expansion of the fibrous web between the web inlet and the web guide cannot be prevented. Since the web feed in the web guide is retarded when the needles stitch into the web, the continuous conveyance of the web through the web inlet produces a pile-up of web between the web inlet and the web guide during the engagement of the

needles, which pile-up in connection with the elastic web expansion may give rise to a wrong draw of the fibrous web into the web guide, and thus a nonuniform preneedling.

To achieve a better felting in the vicinity of the web still hardly compacted, it is already known (AT 265 685 A) to provide the needles in the supply-side portion of the web guide with coarser or more projecting barbs. Since with these coarser or more projecting barbs the positive connection with the fibers is improved, fibers are more and more partly withdrawn from the web, which supports, however, the tendency of the web to undergo an elastic expansion in the draw-in region.

It is therefore the object underlying the invention to develop a device as described above with simple means such that the conditions for the preneedling can be improved considerably in particular in the region where the web is drawn into the web guide.

This object is solved by the invention in that the needles of the needle board disposed in a supply-side portion of the web guide have a denser distribution or, in a manner known per se, coarser barbs than the remaining needles, which barbs lie, however, inside the contour of the working part of these needles.

By means of the coarser barbs of the needles in the draw-in region of the web guide a larger felting, and thus a higher compaction of the fibrous web is achieved with the effect that the possible expansion of the fibrous web between the web inlet and the web guide is limited, when the barbs of the needles in the supply-side portion of the web guide lie inside the contour of the working part of these needles, because only in this case a positive connection between individual fibers and the barbs can be avoided during the with-

drawal of the needles from the fibrous web, and it can thus be prevented that the elastic expansion of the web as a result of an entrainment of fibers in the direction of this expansion is supported by the needles withdrawn from the web engagement. By using needles with coarser barbs inside the contour of the working part, a possibly occurring wrong draw can largely be avoided, and thus an advantageous preneedling can be ensured. A larger felting and compaction of the fibrous web in the draw-in region of the web guide can, however, also be achieved by a higher needle density, where there can likewise be used needles with coarser barbs. The increase of the fiber felting in the inlet portion of the web guide in addition leads to an increase of the tensile strength of the fibrous web at the beginning of the needling operation, so that the preneedling, which must otherwise be restricted in view of a limitation of the comparatively high distortion of an unneeded or only slightly needed fibrous web, can be increased to a surprising extent by a corresponding choice of the needling parameters in the vicinity of the web guide portion subsequent to the inlet portion. Therefore, two-stage or multi-stage needling operations may possibly become superfluous, without having to make concessions as regards predetermined strength values.

To ensure an advantageous initial felting of the fibrous web, without impairing the subsequent needling with needles conventionally used for this purpose, the supply-side portion of the needle board should not extend over more than a third, preferably not more than a quarter of the needle area of the needle board in direction of web movement, with the usual web parameters.

In the drawing, the subject-matter of the invention is represented by way of example, wherein:

- Fig. 1 shows an inventive device for preneedling a fibrous web in a simplified longitudinal section,
Fig. 2 shows segments of the device in the vicinity of the web inlet on an enlarged scale,
Fig. 3 shows a needle with coarser barbs in a simplified side view in the vicinity of the needle tip, and
Fig. 4 shows a representation corresponding to Fig. 3 of a needle with finer barbs.

The device in accordance with the illustrated embodiment comprises a needle board 2 held in a needle bar 1, which needle board is driven by a thrust crank drive not represented in detail, whose push rods 3 act on the needle bar 1. The needles 4a and 4b of the needle board 2 stitch into the dash-dotted fibrous web 5 in the vicinity of a web guide 6, which consists of a stitch base 7 opposite the needle board 2 and a stripper 8 between the stitch base 7 and the needle board 2. Directly before this web guide 6 a web inlet 9 is provided, which is formed by two circulating conveying belts 10 defining between each other a wedge-shaped guiding gap 11 for the fibrous web 5, so that the unneeded fibrous web 5 is compressed in the guiding gap 11 between the conveying belts 10 to an extent which allows a corresponding draft of the fibrous web 5 into the web guide 6. Nevertheless, malfunctions may occur when the web is drawn into the web guide 6. In this connection it should be considered that during the engagement of the needles 4a, 4b into the fibrous web 5, the fibrous web 5 is retarded between the stitch base 7 and the stripper 8, which inevitably leads to a pile-up of the fibrous web 5 continuously supplied via the web inlet 9 directly before the web guide 6.

To eliminate such wrong draw, the needles 4a in a supply-side portion 12 of the web guide 6 are provided with coarser barbs 13 than the needles 4b in the subsequent portion, as this can be seen in connection with Fig. 3 and 4. These coarser barbs

13 produce an increased felting and compaction of the fibrous web 5 in the supply-side portion 12 with the result that the expansion of the fibrous web 5 in the inlet portion of the web guide 6 can be limited, as this is schematically indicated in Fig. 2, in which the elastic expansion of the fibrous web 5 between the web inlet 9 and the web guide 6 can be seen. With the better coherence of the fibers the tensile strength of the fibrous web 5 in the vicinity of the supply-side portion 12 of the web guide 6 is also increased, which is an advantageous condition for an increased needling of the fibrous web 5 also in the vicinity of the remaining needles 4b.

The coarser barbs 13 of the needles 4a in the vicinity of the supply side portion 12 of the web guide 6 should, however, not lead to the fact that during the withdrawal of the needles 4a from the fibrous web 5 fibers are entrained, and therefore the elastic expansion of the fibrous web 5 in the inlet portion of the web guide 6 is supported. For this reason it is recommended to arrange the barbs 13 of the needles 4a such that they lie inside the contour 14 of the needles 4a, as this can be taken from Fig. 3. The needles 4a may for instance have barbs in the range from 30 to 32 gauge. For the subsequent portion, needles 4b with barbs in the range from 38 to 40 gauge can then be used, to ensure an advantageous effect with respect to the preneedling of the fibrous web 5.

Instead of the needles 4a with coarser barbs 13 there might also be used a denser needle pitch, so as to achieve the desired greater felting of the fibrous web 5 in the supply-side portion 12 of the web guide 6. A combination of these measures is of course also possible.

In accordance with the illustrated embodiment, the stitch base 7 and the stripper 8 have a continuous curvature, so that differently inclined portions of the web guide 6 are

formed in direction of web movement. Since during needling the fibrous web 5 lies flat against the stitch base 7, stitch channels differently inclined with respect to the web surface in dependence on the respective inclination of the stitch base 7 are formed for the needles 4a and 4b. The average inclination of the stitch base 7 extends with an inclination towards the direction of movement of the needle board 2, so that there is a preferred inclination of the needle stitches into the fibrous web 5, namely in the sense of stitches with a component in direction of web movement. This predominant stitching direction involves an increase in the longitudinal strength of the fibrous web 5. Instead of the curved web guide 6 there might of course also be used a conventional, straight web guide.

C l a i m s :

1. A device for preneedling a fibrous web, comprising at least one needle board reciprocatingly movable in stitching direction, whose needles form barbs for entraining the fibers, and comprising a web guide, which consists of a stitch base opposite the needle board and a stripper between the stitch base and the needle board, characterized in that the needles (4a) of the needle board (2) arranged in a supply-side portion (12) of the web guide (6) have a denser distribution or coarser barbs (13) than the remaining needles (4b), which barbs lie, however, inside the contour (14) of the working part of the needles (4a).

2. The device as claimed in claim 1, characterized in that the supply-side portion of the needle board (2) with the coarser needles (4a) or the denser needle distribution does not extend over more than a third, preferably not more than a quarter of the needle area of the needle board (2), in direction of web movement.

3. A device for preneedling a fibrous web substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.



Application No: GB 9712766.6
Claims searched: 1-3

Examiner: Martin Riley
Date of search: 22 August 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): D1R (RGFE, RGFX, RGFZ)

Int Cl (Ed.6): D04H 18/00

Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
Y	GB 1547606 A (TORRINGTON) - see page 2, lines 1-27	1,2
Y	US 4131978 A (SINGER) - see column 1, lines 41-45	1,2
Y	US 4037297 A (FOSTER) - see figure 5 1	1,2
Y	AT 265685 A (FEHRER) - see page 2, lines 16-20	1,2

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.